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HANDBOOK

OPERATION AND SERVICE INSTRUCTIONS

TYPES B-3 AND B-3B

20-TON ADJUSTABLE TRIPOD HYDRAULIC JACK

(GENERAL TIRE AND RUBBER)

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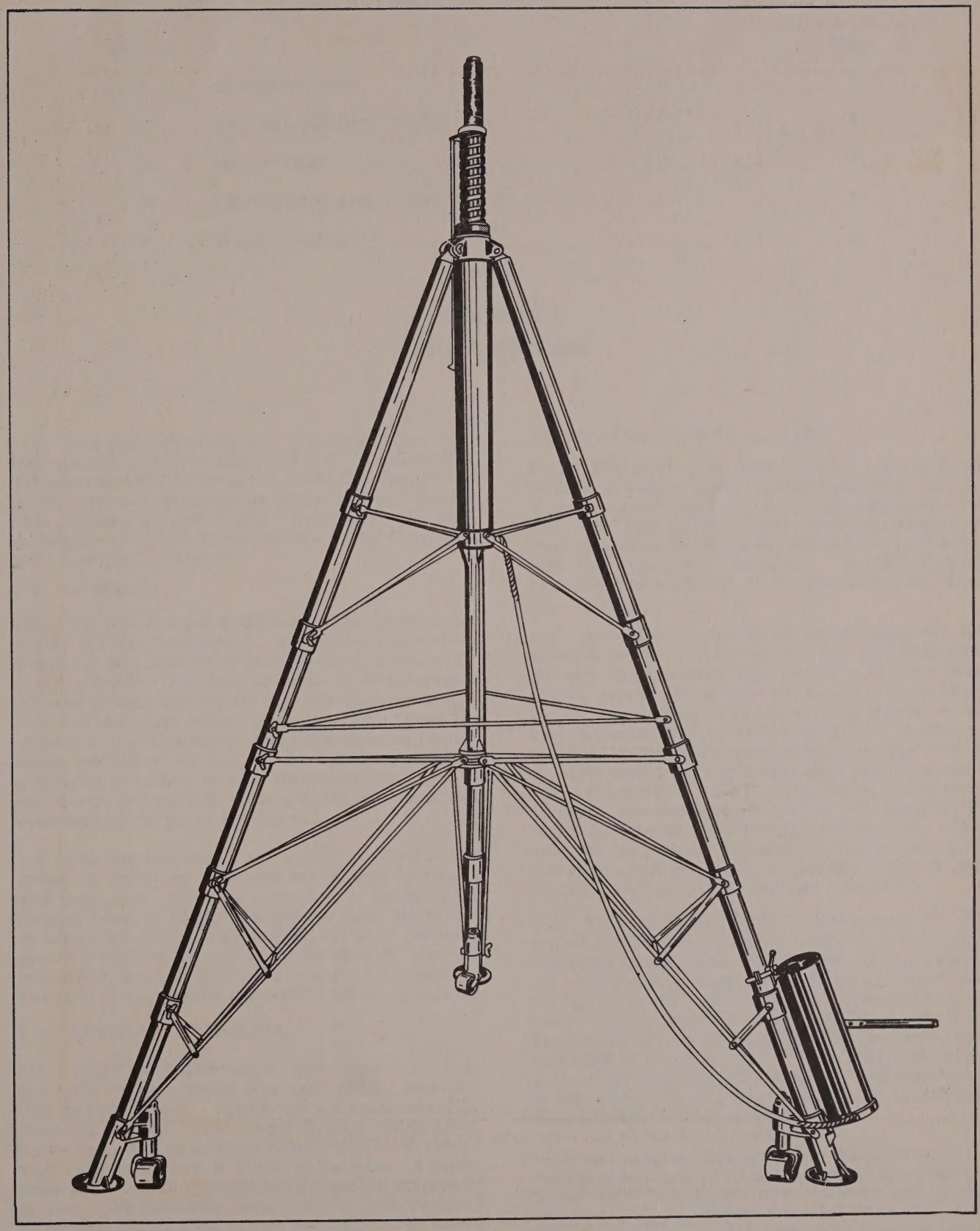
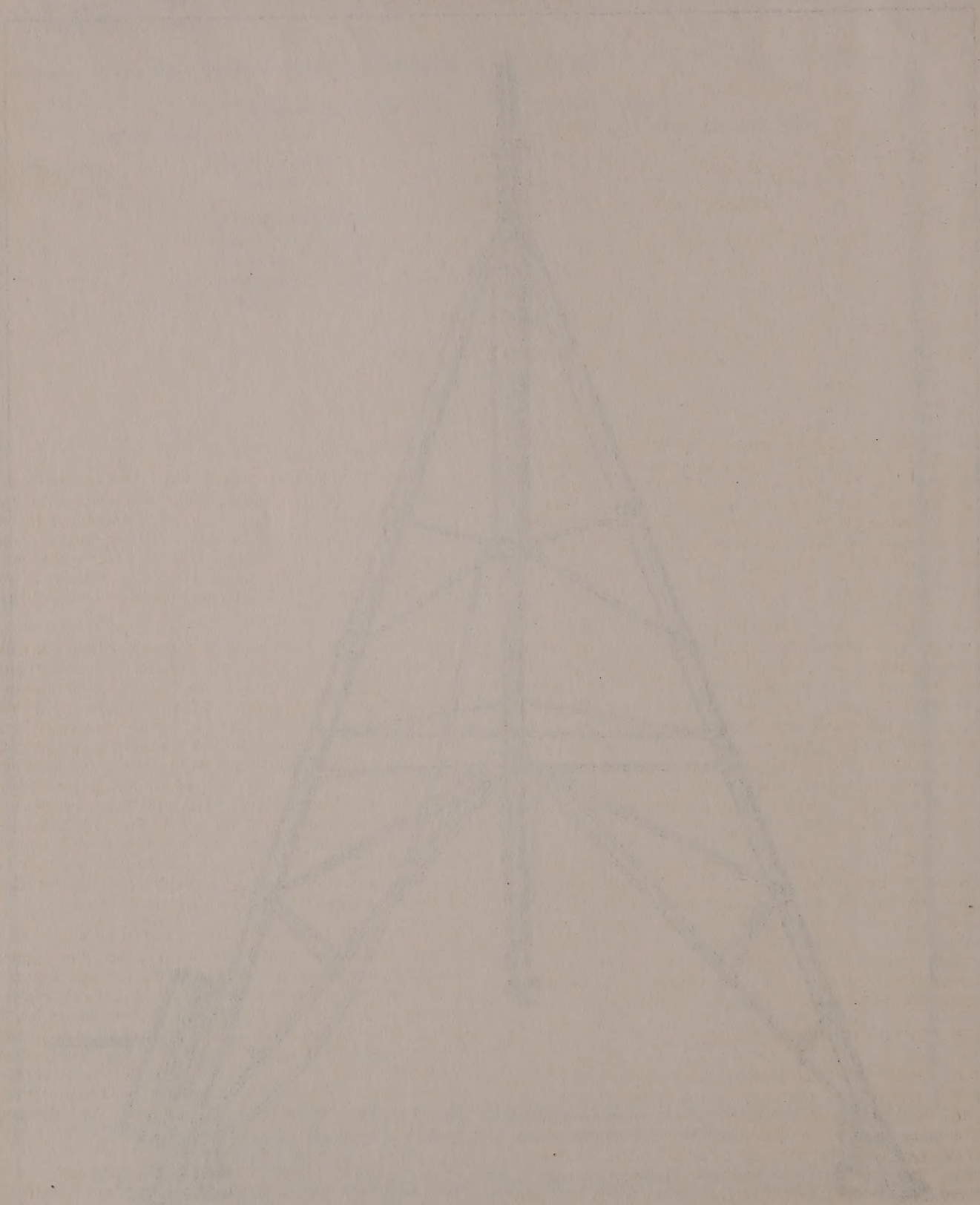


Figure 1-1. Type B-3 20-Ton Adjustable Tripod Jack Assembly



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SECTION I
INTRODUCTION

1-1. This publication contains operation and service instructions for the AF type B-3B, 20 Ton Adjustable Tripod Jack, USAF Drawing No. 52J6433 manufactured by The General Tire and Rubber Company, Akron, Ohio, and the AF type B-3, USAF Drawing No. 44K9820 manufactured by the Dixon Manufacturing Company, Inc., Coffeyville, Kansas.

1-2. GENERAL.

1-3. The type B-3 and B-3B Jack, (See figure 1-1.) is a portable self-contained, hydraulically operated, tripod type jack used for raising the wing, nose or tail of the airplane. The jack consists of three principal assemblies: a hydraulic lift unit incorporating a ram and extension screw; a tubular steel tripod leg structure, and a hydraulic pump unit which is mounted on one leg of the tripod. The tripod structure is adjustable to various heights (by means of six sets of leg extensions) ranging from a basic 52 inches to a maximum lift height of 197 inches.

1-4. The leg extensions are quickly attached or detached by bolts and wing nuts for changes in height. The pump unit, which is connected to the lift by a flexible hose, is quickly removable from the tripod structure by a cam action clamp. A rise indicator attached to the lift unit shows the distance the load has been lifted, and is helpful in keeping the load balanced when two or more jacks are used to lift a single load.

1-5. GENERAL DESCRIPTION.

1-6. PUMP UNIT ASSEMBLY. (See figure 1-2.) This unit consists of a piston (14) and cylinder assembly (20), base (46), and a cylindrical oil reservoir (22). The base has drilled passages through which oil is drawn from the list unit and returned to the oil reservoir. The reservoir is bolted to the base. A safety valve (39), which by-passes fluid from the pump and/or ram to the reservoir when certain predetermined pressures are developed, is installed in the base. The intake valve (29), discharge valve (45) and pressure release valve (31) are also incorporated in the base assembly, and easily accessible without complete disassembly of the pump unit.

1-7. LIFT UNIT. (See figure 1-3.) The lift unit consists of a tubular outer cylinder assembly (25), and inner ram assembly (24), and a ram extension screw (10). The lugs welded to the top of the cylinder are attaching points for the upper legs of the tripod structure (See figure 3-1, index 55). The attaching leg braces are bolted to lugs at the lower end of the cylinder.

1-8. Pressure exerted by the pump raises the ram which is guided in its ascent by a key (17) secured in the ram upper bearing (19). The key rides in a longitudinal groove which runs the entire exterior length of the ram. While the ram is being raised, a lock nut (16) rotates freely about the ram (of its own weight) following the special groove on the ram. The lock nut provides protection to the equipment and personnel in case of hydraulic failure. The ram in turn houses a manually operated extension screw (10) which is provided to take up the clearance between the closed height of the jack and the load. A height indicator (5 and 6) attached to the top of the ram shows the distance (in inches) that the load has been lifted.

1-9. TRIPOD STRUCTURE. (See figure 3-1.) The tripod structure consists of three basic (or upper) legs (55) attached to the top end of the lift unit assembly. The legs are anchored by braces (51) to the lower end of the lift unit. The basic jack has a closed height of 52 inches. By adding additional sets of leg extensions, the effective height may be increased in multiples of 18 inches, i.e. 70, 88, 106, 124, to 142 inches, its maximum closed height. All connections of leg extensions and braces are made by bolts and wing nuts to facilitate assembly.

1-10. A castered foot assembly (22) is used at the bottom of each leg. This foot assembly has a spring-loaded yoke and spindle which holds the base of each foot assembly two inches from the ground (when the jack is not loaded). This permits easy positioning of the jack by means of the swiveled wheels. When load is applied, the base rests flat on the ground.

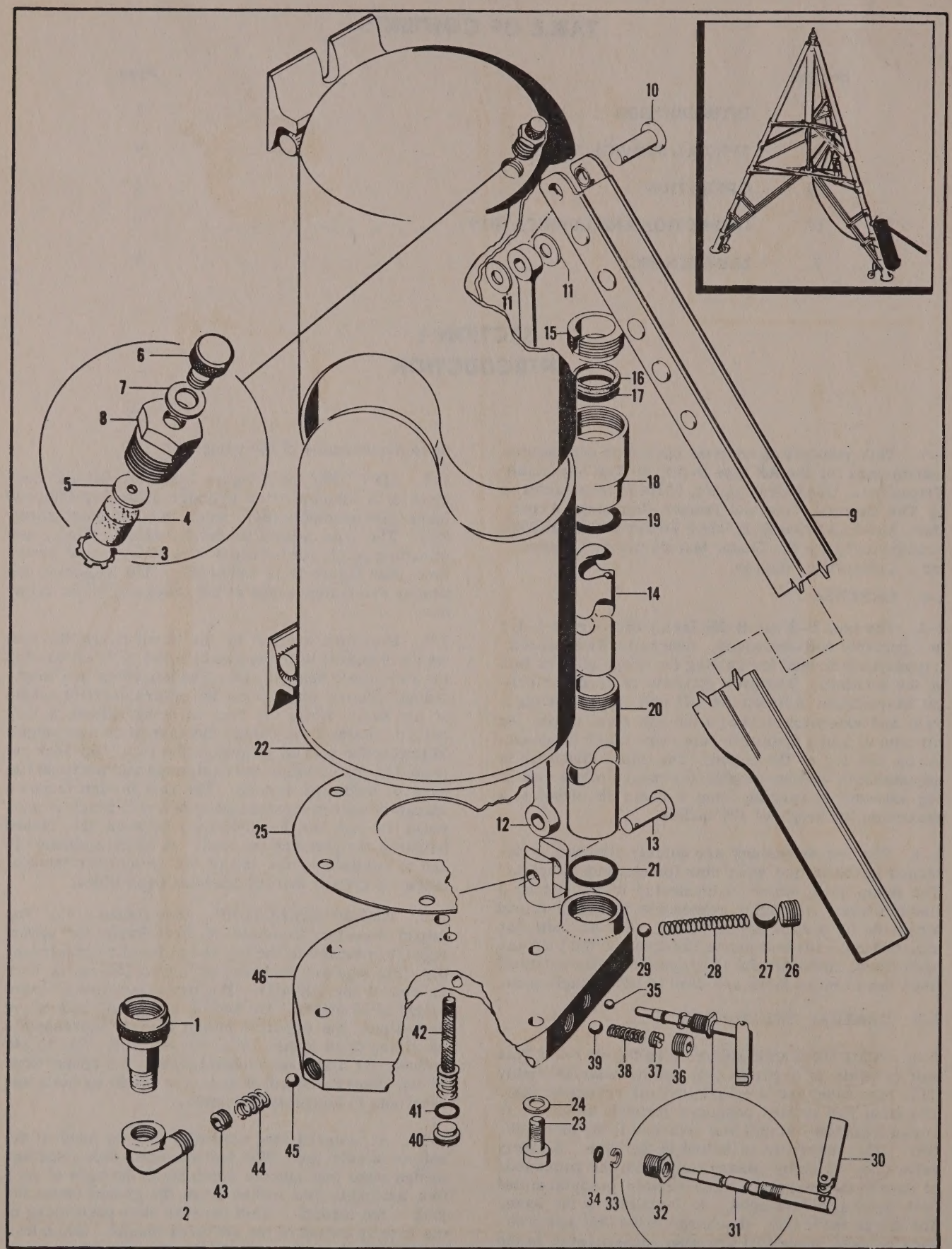

Figure 1-2. Pump Unit Assembly Exploded

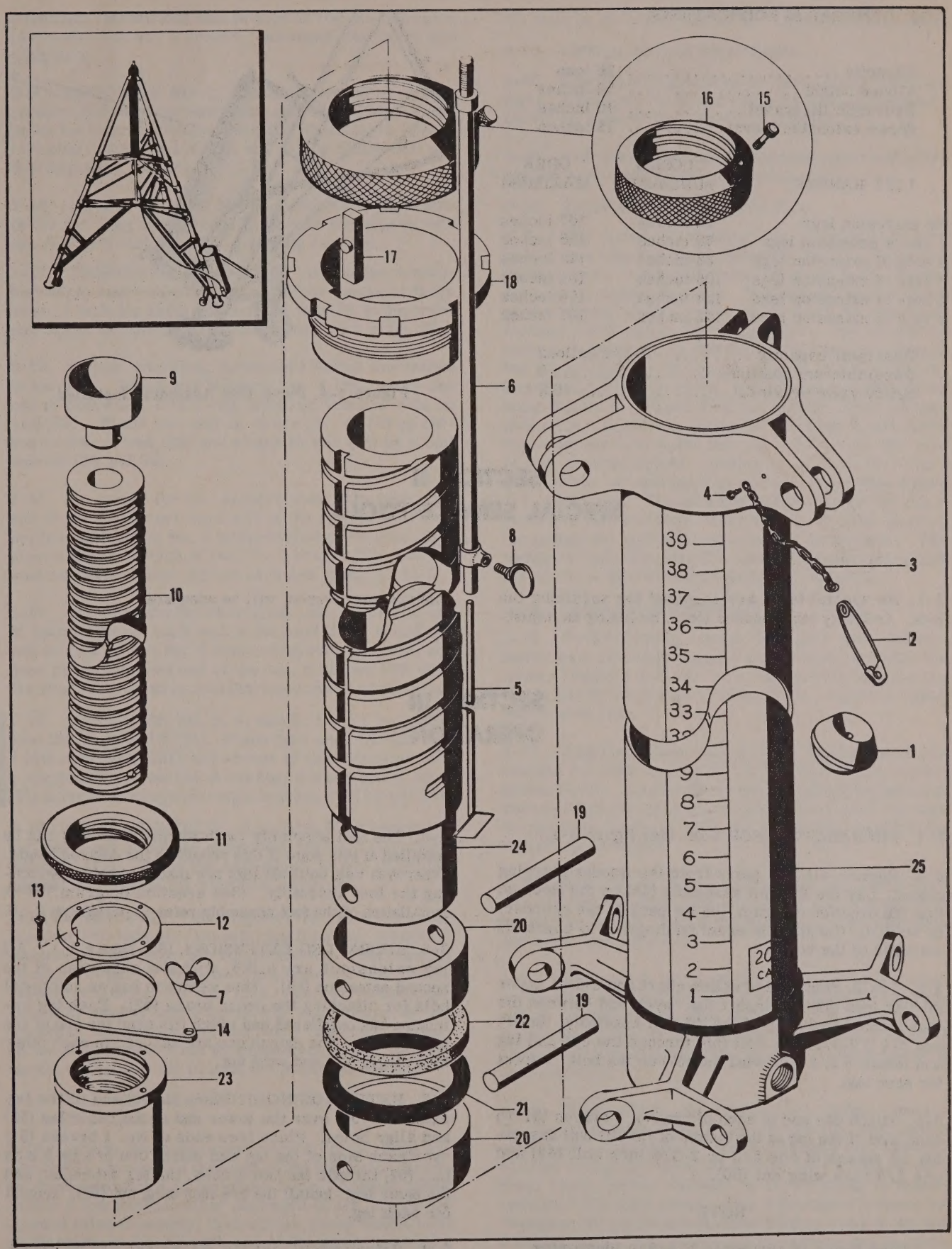

Figure 1-3. Lift Unit Assembly Exploded

1-11. GENERAL SPECIFICATIONS.

Capacity	20 tons
Closed height	52 inches
Hydraulic lift travel	40 inches
Screw extension travel	15 inches

LIFT RANGES	CLOSED MINIMUM	OPEN MAXIMUM
No extension legs	52 inches	107 inches
1 set of extension legs	70 inches	125 inches
2 sets of extension legs	88 inches	143 inches
3 sets of extension legs	106 inches	161 inches
4 sets of extension legs	124 inches	179 inches
5 sets of extension legs	142 inches	197 inches

Reservoir capacity	3-1/2 gallons
Pump fulcrum positions	5
Safety valve overload	10%

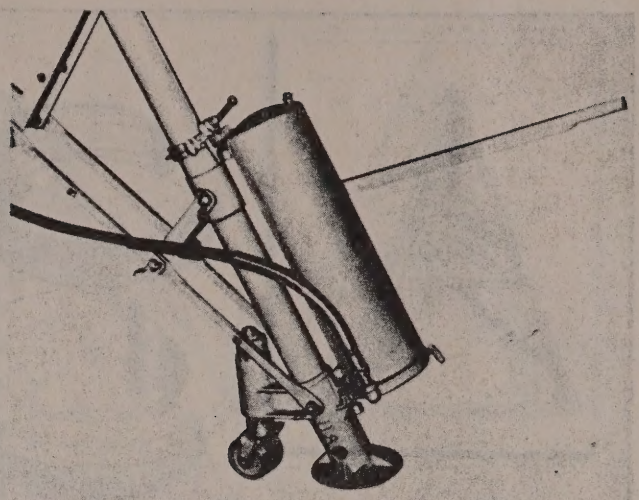

Figure 1-4. Pump Unit Assembly Installed

SECTION II
SPECIAL SERVICE TOOLS

2-1. No special tools are required for servicing the jack. Ordinary maintenance tools, including an adjustable spanner wrench, will be adequate.

SECTION III
OPERATION

3-1. PREPARATION FOR USE. (See figure 3-1.)

3-2. Remove all jack parts from the wooden shipping boxes. Lay the lift unit assembly (58) on the floor so that the erection diagram, (on the back of the cylinder) is visible. Consult the erection diagram to check off contents of the boxes.

3-3. LEGS. Study the erection chart and select upper tubular legs (55) and insert the "eye" end between the lugs located at the top of the lift unit assembly. Insert one 3/4 x 2-1/2 inch bolt (56) through the eye and lug and install a 3/4 inch wing nut (57) on the bolt. Repeat for each leg.

3-4. Attach one end of each of two No. 1 braces (51) to each side of the lug at the bottom of the lift unit assembly by means of one 5/8 by 2-1/2 inch bolt (49) and one 5/8 inch wing nut (50).

NOTE

Each brace is numbered to aid in identifying the part.

3-5. The foot assembly (with wheels attached) can be installed at this point if this should be the desired height. Otherwise wait until all legs are installed before attaching the foot assembly. (See erection diagram.) For installation of the foot assembly refer to paragraph 3-16.

3-6. ADDING LEG EXTENSIONS. (See figure 3-1.) All leg extensions are alike, with the exception of the second extension (45). This extension has an additional hole for attaching the cross brace (42). Each leg extension has one flared end which fits over the end of the leg above it. The extensions are secured to each other by a single bolt and wing nut.

3-7. EXTENSION NO. 1. Place flared end of the leg extension (54) over the lower end of the basic leg (55) and align holes. Place free ends of No. 1 braces (51) over each side of the leg and insert one 5/8 by 5 inch bolt (52) through the two braces, the leg extension, and the basic leg. Install the 5/8 inch wing nut (53). Repeat for each leg.

3-8. Before additional leg extensions can be added, detach No. 1 braces (51) where they attach to lift unit

assembly. Install one end of each of two No. 2 braces (48) under the No. 1 braces. Reinstall the bolts and wing nuts.

3-9. EXTENSION NO. 2. Place flared end of leg extension (45) over the end of the extension (54). Align holes for inserting bolt. Place end of two No. 2 braces (48) over holes, and install one 5/8 by 5 inch bolt and 5/8 inch wing nut (47).

3-10. Install one end of No. 7 braces (42) to each side of the No. 2 leg extension (45). Secure the braces with one 5/8 by 5 inch bolt (43) and wing nut (44).

3-11. TENSION BAR AND WEB. Attach the tension bar (40) to under side of lift unit (58) by means of three bolts, 1 inch long (41). Attach the web (38) to the lower end of the tension bar (40) with three 1 inch bolts (41).

3-12. Before installing extensions attach the braces to the web. Place end of brace No. 4 (34) under one end of brace No. 3 (37) and place on inboard side of web (38). Place one end of brace No. 4 (34) on outboard side of web (38) and attach to web (38) by a bolt and nut (35 and 36).

3-13. To install the two support links (33), place one end of each link over each end of the stud (31). Place the free end of the No. 4 brace (34) over the stud, then place one end of each of two No. 5 braces (30) over the stud and install nuts (32) on each end of the stud.

3-14. To install the two short links (29), place one end of each link over each end of the stud (27). Place one end of each of two No. 6 braces (26) over the stud, and then place the free end of the No. 5 braces (30) over the stud. Attach wing nuts (28) on each end of the stud.

3-15. EXTENSION NO. 3, 4, and 5. Install leg extension No. 3, 4, and 5 (23). Place free end of brace No. 4 (34) over links (33) and secure to leg extension with a single bolt and nut (24-A and 25). Secure brace No. 3 (37) to leg extension with single bolt and nut (24 and 25).

3-16. FOOT ASSEMBLY. Attach the foot assembly to the lower end of the leg extension. Install bolt (12) and wing nut (13). Place the assembled tripod structure upright and tighten all wing nuts securely.

3-17. PUMP UNIT. (See figure 1-2). With the graduated height-indicator scale facing forward, install the pump assembly (3) on the right hand leg. Place the lug on the lower part of the pump reservoir into the slotted support located on the foot (22). Place the pump clamp assembly on the leg so the clamp will engage the lug welded at the upper end of the pump reservoir. Tighten the wing nut (4) of the clamp assembly, and turn the handle of the cam (8) to lock the pump assembly.

3-18. CONNECTING PUMP TO LIFT UNIT. (See figure 1-2).

3-19. Attach the hose connector (2) to the hose assembly (1). Insert the free end of the connector (2) into the hose connection in the pump hose. Actuate pump handle a few times to clear passages of air. Close the release valve assembly, then actuate pump handle until oil flows from the lift unit-end of the hose assembly.

3-20. Attach the free end of the hose assembly (1) into the hole in the lower end of the lift unit cylinder (58).

3-21. CHECK AFTER ERECTION.

3-22. Check all connections to make certain they are tight. Close air vent assembly in pump reservoir. Check all structural braces for rigidity.

3-23. Lubricate all exposed operating parts and bearing surfaces with a light lubricating oil.

3-24. PRINCIPLES OF OPERATION.

3-25. The jack is designed to lift loads up to 20 tons by use of a single action hydraulic pump. Actuating pump handle causes the pump piston to travel up and down in the piston cylinder. The upward stroke of the piston draws oil into the cylinder from the reservoir through a passage in the pump base. The downward movement of the piston is the power stroke which forces the oil through the discharge valve in the pump base. From the discharge valve, the oil travels through the hose (figure 3-1, index 1) to the bottom of the lift unit assembly. Continued action of the pump forces more oil under the ram in the lift unit, and raises the ram to any desired height. Lowering of the ram is accomplished by opening the release valve (See figure 1-2, index 31). The release valve permits the oil to return to the reservoir from the lift unit (by-passing the pump) through passages in the pump base. The weight of the load forces the ram downward which ejects all oil from the lift unit back to the reservoir.

3-26. OPERATION INSTRUCTION.

3-27. POSITIONING. Move the jack into position under the load. Align the jack screw directly under the point of contact with the load. Make sure all feet are level, and if the ground is soft, place a board or plank under each foot.

3-28. RAISING. (See figure 1-3.) Remove jack pad adapter (1) from safety pin (4) and install into socket assembly (9). Loosen the extension screw lock nut (11) and turn the extension screw (10) by hand until the jack contacts the load, or until the screw has reached its maximum extension.

3-29. While the hydraulic ram (24) is fully compressed, position the rise indicator (5) so the pointer is on the zero inch line. This adjustment is made by loosening the thumb screw (8).

3-30. Make sure the retaining screw (15) is loose, so the ram lock nut (16) will freely rotate on the ram spiral groove as the ram is raised. (This lock-nut prevents the ram from suddenly descending in case of hydraulic failure, or slipping of the load when the jack is in action.)

3-31. PUMP UNIT. (See figure 1-2). Before operating the pump unit, loosen the air vent (6), and tightly close release valve (31). The pump handle (9) is adjustable (by using any one of the riveted pins in the handle) from short, power strokes on heavy loads to faster operation for light loads. This adjustment if made by engaging the piston at distances farther away from the fulcrum. It is not necessary to remove the pin (10) which attaches the pump handle to the link (12), but merely lift the handle out of the end of the piston (14)

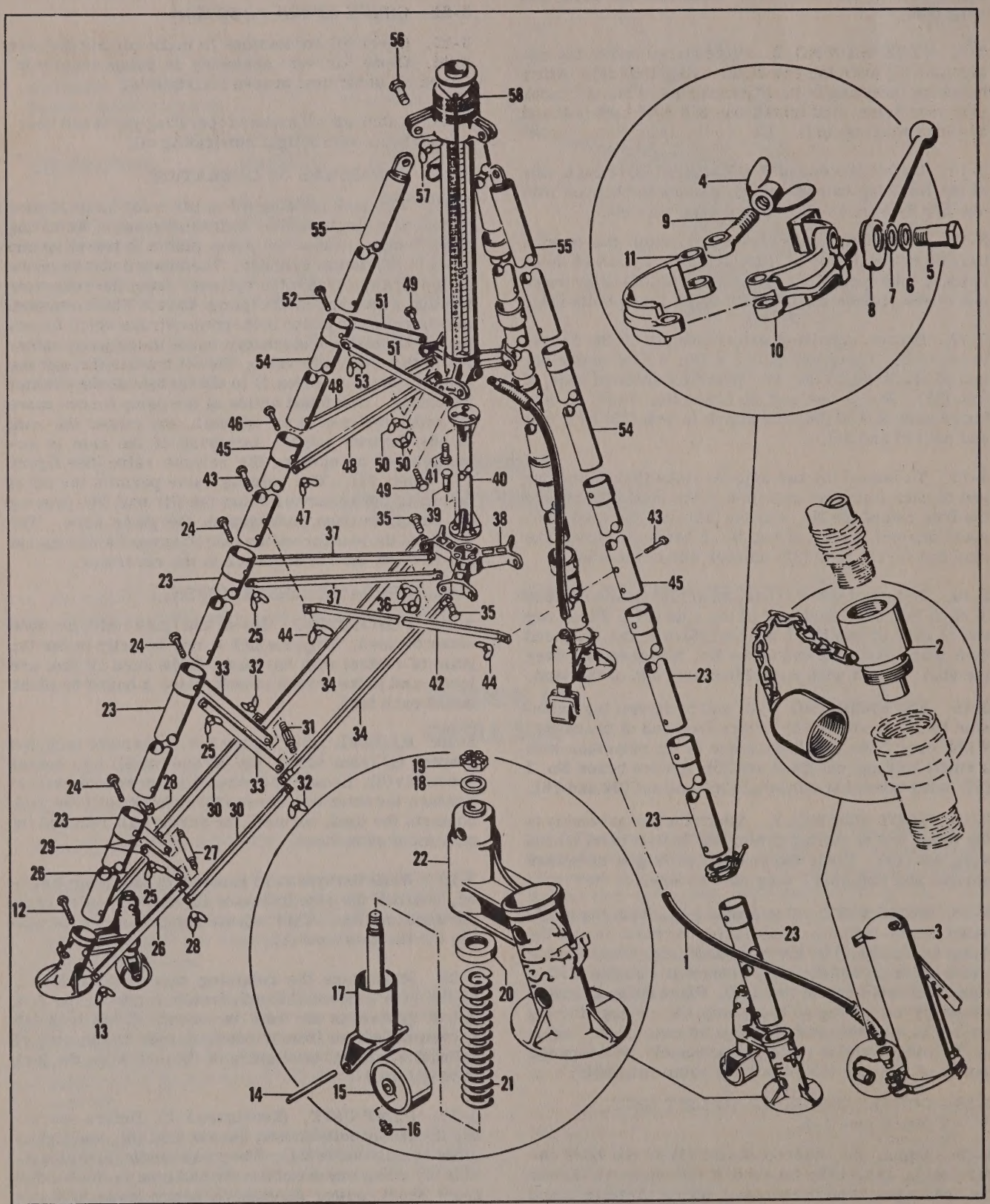

Figure 3-1. Typical 20 Ton Adjustable Tripod Jack Exploded

and replace the handle at a new position in the jaws of the piston.

3-32. LOWERING. (See figure 1-3.) Before lowering the load, rotate the ram lock (16) to the top of the ram, by hand, and tighten the knurled screw to hold the lock nut in place. Slowly open the release valve (31), and lower the load.

CAUTION

The speed of descent of the load is controlled by the release valve. Do not open the valve too quickly.

3-33. Close air vent after the load is lowered. Turn the screw extension down into the ram. Close the release valve.

SECTION IV
INSPECTION AND LUBRICATION

4-1. INSPECTION BEFORE USE.

4-2. TRIPOD UNIT. (See figure 3-1.) Check the casters of the wheel assembly (17) for free swinging operation. Check wheel for easy turning. Lubricate axle and spindle bearing surfaces with light oil. Tighten wing nuts on bolts at all places.

4-3. PUMP UNIT. (See figure 1-2.)

a. Check oil level by removing air vent assembly (3 to 8). Proper height should be 1-1/2 inches below air vent opening. Refill, if necessary, with MIL-O-5606 oil only.

b. Close release valve (31) and open air valve (6). Actuate pump handle and raise ram.

c. Check hi-pressure hose (1) for leaks at connections.

d. Check all openings in pump base for signs of oil leaks.

e. Lubricate piston (14) with light engine oil, also pump fulcrum pin (10).

4-4. LIFT UNIT. (See figure 1-3). Inspect ram for dirt or damage. Make certain it is lubricated. If dry, lubricate with S.A.E. 10 engine oil. Check lock-nut (16) to see that it turns freely of its own weight on the ram, and that the retaining screw (15) will secure the nut when tightened. Turn extension screw (10) by hand to its full height to make certain that it turns freely. Lubricate, if dry, with MIL-O-6082, Grade 1065 engine oil.

4-5. MONTHLY INSPECTION.

4-6. No monthly inspection is required for the jack. The operator will check the jack's performance by referring to figure 5-1, Section V.

4-7. SIX MONTH INSPECTION. (See figure 1-2).

a. Remove the air vent assembly (3 to 8) and drain all the oil from the reservoir. Wash out the reservoir with white gasoline or naptha.

b. Remove the oil screen (42). Use compressed air to blow any dirt or lint from the screen.

NOTE

When re-installing screen, always replace the "O" ring (41) with a new one.

SECTION V
MAINTENANCE

5-1. GENERAL. The performance of the jack depends on the proper functioning of those parts which control the flow of the hydraulic oil, and the seals which control the flow of the hydraulic oil, and the seals which hold the pressure. Under normal conditions, the jack will operate satisfactorily and will require a minimum of maintenance. Except for the service troubles and remedies listed in figure 5-1, actual replacement or repair of parts require disassembly and must be performed by overhaul personnel.

5-2. PAINTED SURFACES. Where paint has been chipped or scratched off, use sandpaper to remove the rust and scale. Use white gasoline, naptha or kerosene to remove any oil or grease. Refinish the surface in accordance with AF Bulletin F49-4, Color 506, Spec. MIL-E-7729.

5-3. SERVICE TROUBLES AND REMEDIES.

NOTE

Troubles are usually located at the pump or the lift unit cylinder. After observing the trouble, refer to the following table for the cause and remedy.

TROUBLE	PROBABLE CAUSE	REMEDY
JACK WILL NOT RAISE	Release valve is open (oil passing back to reservoir).	Tighten release valve. If necessary, reopen valve, pump rapidly to flush out foreign matter. Close valve.
	Intake valve is open.	Pump rapidly to flush.
	Discharge valve is open.	Pump rapidly to flush.
	Intake valve is stuck.	Pump rapidly to flush.
	Lack of oil.	Refill oil reservoir.
	Air under ram.	Bleed oil system.
	Faulty safety valve. (Set too low, or leaks.)	Replace pump assembly.
JACK WILL NOT RAISE CAPACITY LOAD	Faulty safety valve. (Set too low.)	Replace pump assembly.
	High pressure hose leaks.	Tighten or replace.
	Release valve leaks.	Tighten.
	Discharge valve leaks.	Replace pump assembly.
	Faulty packing.	Replace lift unit.
	Leaking pump packings.	Replace pump assembly.
JACK WILL NOT RAISE TO FULL HEIGHT	Lack of oil.	Refill reservoir.
	Intake valve stuck.	Flush rapidly.
	Closed air vent.	Open vent.
	*Clogged screen.	Clean oil screen.
RAM RISES AND FALLS DURING EACH STROKE	Discharge valve leaks.	Replace pump assembly.
JACK WILL NOT HOLD UP LOAD	Release valve leaks.	Tighten valve nut.
	Discharge valve leaks.	Replace pump assembly.
	Safety valve leaks.	Replace pump assembly.
	Faulty ram "Vee" ring.	Replace lift unit.
	Faulty ram "O" ring.	Replace lift unit.
	Oil line leaks.	Replace hi-pressure hose.
JACK WILL NOT LOWER THE LOAD	Ram safety lock not in right place.	Rotate nut to top of ram and tighten retaining screw.
	Broken release valve.	Replace pump assembly.
	Bent ram.	Replace lift unit.

Figure 5-1. (Sheet 1 of 2 sheets) Trouble Shooting Chart

TROUBLE	PROBABLE CAUSE	REMEDY
RAM WILL NOT COMPLETELY LOWER	Ram safety lock nut not in right place.	Rotate nut to top of ram and tighten screw.
	Damaged ram.	Replace lift unit.
	Faulty ram "Vee" ring.	Replace lift unit.
	Air under ram.	Bleed system.
	Restricted oil passage on return to reservoir.	Disconnect one end of hose connection and pump rapidly to flush.
HANDLE WORKS TOO HARD	Wrong position for handle in piston.	Change position.
	Restricted oil passage.	Disconnect hose and pump to flush line.
	*Clogged oil screen.	Clean oil screen.
HANDLE STROKE PARTIALLY WASTED	Air in pump cylinder. Intake valve sticks.	Open release valve and flush rapidly to flush system.
	*Clogged screen.	Clean oil screen.
	Closed air vent.	Open air vent.
HANDLE MOVES UP WITHOUT EFFORT	Discharge valve leaks, or air in pump cylinder.	Open release valve and flush rapidly.
HANDLE SNAPS BACK	Closed air vent.	Open air vent.
	Intake valve sticks.	Open release valve and flush rapidly.
	*Clogged oil screen.	Clean oil screen.

*NOTE

A clogged oil screen may be an indication of dirty oil. Drain the oil, flush reservoir and refill with new oil.